Vadose Zone Fact Sheet
Argonne National Laboratory-East

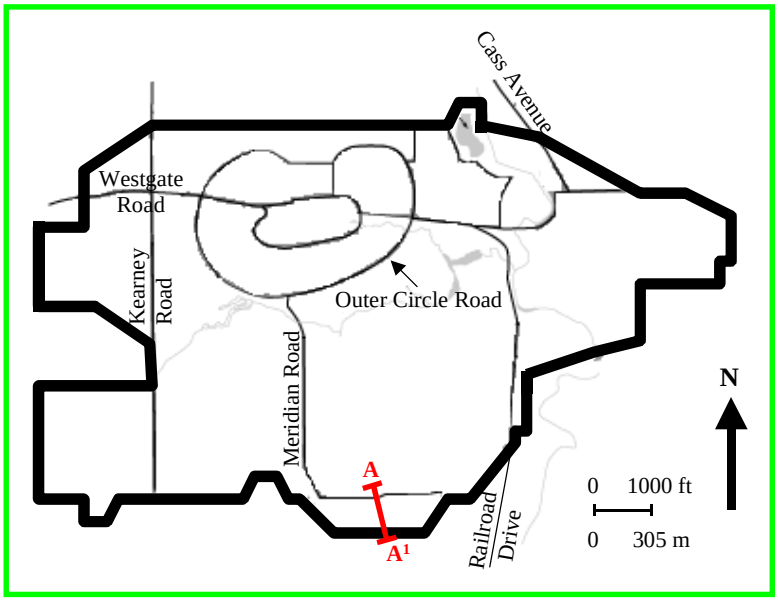
Background: Argonne National Laboratory-East (ANL-E) occupies a 1,514-hectare (3,740-acre) tract located in DuPage County, approximately 43 km (27 mi) southwest of metropolitan Chicago, Illinois. ANL-E has been involved in research and development activities in support of the Department of Energy and its predecessors since 1943. Currently, it serves as a multidisciplinary research and development laboratory that conducts basic and applied research to support the development of energy-related technologies.

Issues: Contaminants in the vadose zone and ground water do not pose an immediate threat to the work force or the general public.

Vadose zone infiltration: Vadose zone infiltration in contaminated area has been minimized through capping and drainage control.

Vadose zone characterization/remediation: The soils and ground water at the ANL-E have been contaminated as a result of accidental spills, past materials management practices, and former waste disposal practices. Removal actions, soil mixing, and capping has remediated or contained in place vadose zone contamination.

Precipitation: The annual average precipitation per year is 80 cm (31 in).

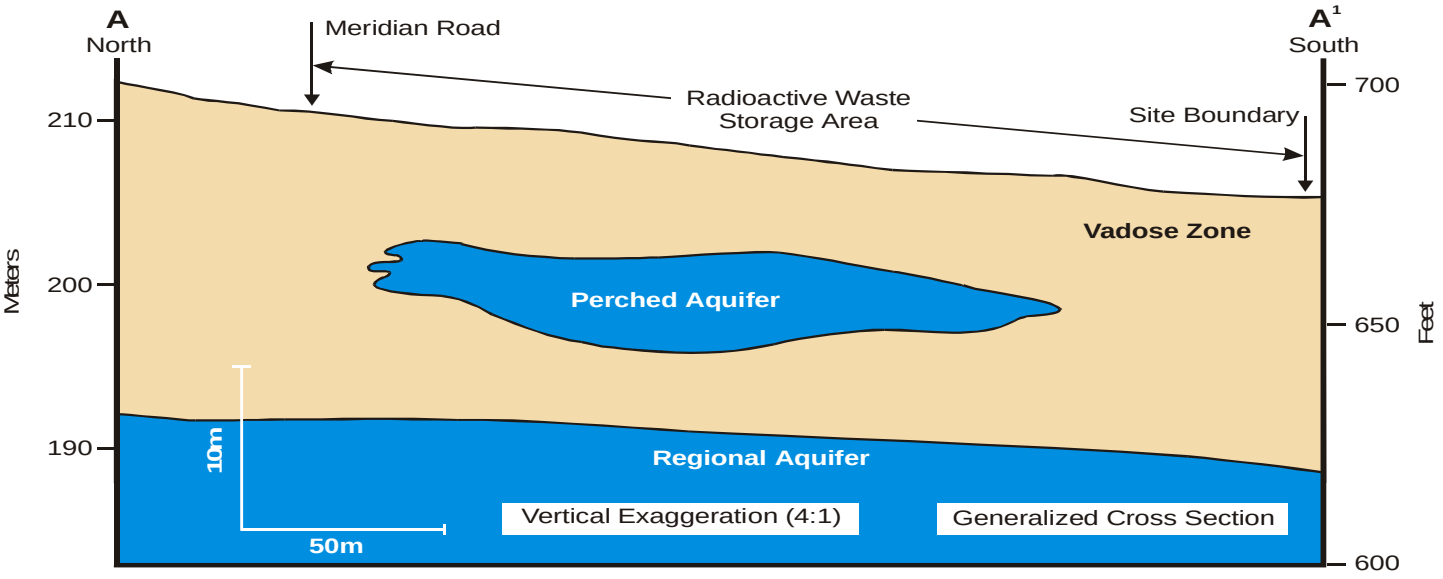


Surface waters: The grounds contain a number of small ponds and streams. The principal stream is Sawmill Creek, which runs through the site in a southerly direction and enters the Des Plaines River about 2.1 km (1.3 mi) southeast of the center of the site. The Des Plaines River flows southwest until it joins the Kankakee River about 48 km (30 mi) southwest of ANL-E to form the Illinois River.

Geology: The terrain of ANL-E is gently rolling, partially wooded, former prairie, and farmland with an average elevation of 221 m (725 ft) above sea level. The geology consists of about 18 to 30 m (60 to 100 ft) of fine grained, low permeability glacial till deposited over dolomite bedrock. Shale, older dolomite, and sandstone underlie the dolomite. The beds are nearly horizontal.

Vadose zone thickness: The thickness of the vadose zone ranges from 15 to 30 m (50 to 100 ft) for much of the site, with the depth to perched zones 7 to 11 m (22 to 34 ft).

Major contaminants of concern: Contaminants of concern include volatile and semi-volatile organic compounds, metals, polychlorinated biphenyl, and a variety of radionuclides.

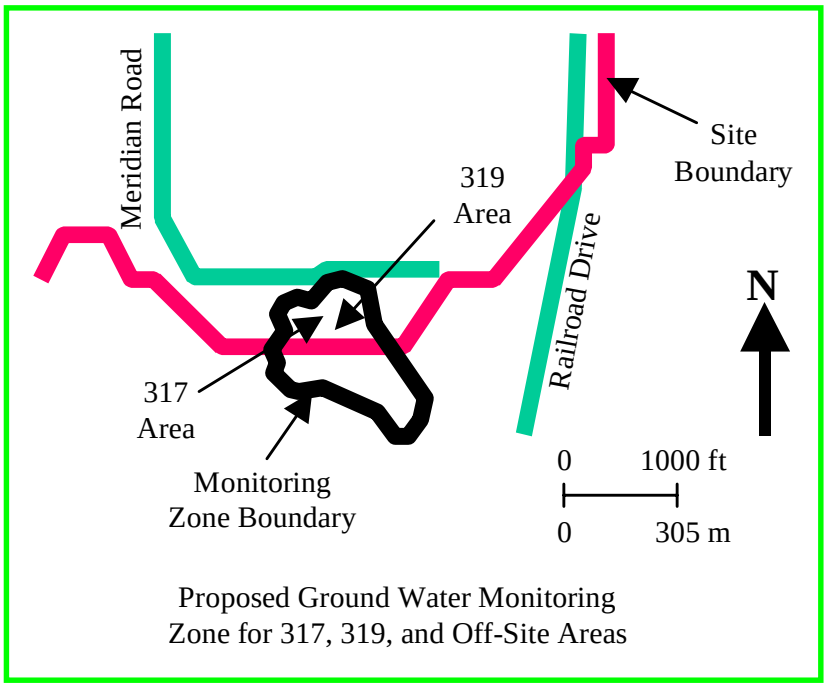


September 2000

Ground Water Fact Sheet
Argonne National Laboratory-East

Background: Argonne National Laboratory-East (ANL-E) occupies a 1,514-hectare (3,740-acre) tract located in DuPage County, approximately 43 km (27 mi) southwest of metropolitan Chicago, Illinois. ANL-E has been involved in research and development activities in support of the Department of Energy and its predecessors since 1943. Currently, it serves as a multidisciplinary research and development laboratory that conducts basic and applied research to support the development of energy-related technologies.

Hydrogeology: Potentially contaminated subsurface water in the 317 and 319 areas (areas of known subsurface contamination) is found in two major horizons: 1) perched zones in the glacial till and 2) the regional aquifer. Perched aquifers are found in discontinuous deposits of coarse-grained materials (sand/silt/gravel). The regional water-table aquifer is present just above and in the dolomite bedrock, 15 to 30 m (50 to 100 ft) below the surface. The dolomite aquifer is about 60 m (200 ft) thick. A deeper sandstone aquifer lies between 150 and 450 m (500 and 1,500 ft) below the surface. Relatively impermeable shale separates the upper dolomite aquifer from the underlying sandstone aquifer, and retards the hydraulic connection between the two. Ground water flow from the laboratory is southward, toward discharge points along the Chicago Sanitary and Ship Canal, and the Des Planes River. The ground water velocity at the contaminated plumes is approximately 11 m (37 ft) per year.



Proposed Ground Water Monitoring Zone for 317, 319, and Off-Site Areas

Issues: Forest preserves occupy the area between the laboratory and the ground water discharge points. No domestic or municipal wells for potable water are found in this area. Water from wells fitted with hand pumps in the forest preserve has revealed some volatile organic compound contamination.

Ground water characterization/remediation: Individual plumes are not delineated at the Lab, but a proposed ground water monitoring zone for the 317, 319, and adjacent off-site areas (areas of known ground water contamination) has been identified. Ground water pump and treat systems are operational in the 317 and 319 Areas. The pumping provides hydraulic control of plume migration and the contaminants are treated through the Laboratory Wastewater Treatment Plant (LWWTP). In a few years trees via phytoremediation should provide hydraulic control and destruction/transpiration of the contaminants. No off-site remediation is anticipated.

Ground water use: The ground water under the site is potentially potable. Four domestic wells previously used are completed in the dolomite aquifer. Since Argonne now receives Lake Michigan water, these wells are no longer in use, but are being maintained as a backup system. Ground-water flow is to the southeast and no potable wells exist in the forest preserve southeast of the 300 Area.

Plume Designation	Major Contaminants	Depth	Remedial Approach
317	Trichloroethylene (TCE); trichloroethane (TCA)	11 m (35 ft)	Pump and treat with discharge into the LWWTP; phytoremediation
319	Vinyl chloride; 1,2-dichloroethane; TCE; tritium	6 m (20 ft)	Pump and treat with discharge into the LWWTP; phytoremediation; engineered cap